Engytatus geniculatus Reuter—an Important Pest of Tomatoes in Hawaii (Hem.)

BY J. F. ILLINGWORTH

(Presented at the meeting of April 5, 1928.)

During my recent trip to Hawaii, Japanese gardeners called my attention to the fact that many of their tomatoes failed to set fruit. I found the vines growing in a very thrifty condition, and though there were many flowers there were few fruits developing.

Sweeping with the insect net over the vines I collected many small mirid bugs. I then found that these insects were closely associated with the blossoms. Placing the cyanide tube over individual flowers I saw that I could in this way collect great numbers of the bugs. Further examination showed that they were a real pest, sucking the juice from the developing ovaries, and thus causing the falling of the blossoms prematurely. Hence the result was that little or no fruit was setting on the vines.

I find that this bug was first reported by Swezey, who collected it on tomato vines in Manoa Valley, August 13, 1924 (See P.H.E.S. VI, 18). E. P. Van Duzee determined this species for Swezey (See P.H.E.S. VI, 230), stating that it occurred from Florida to Texas and through Arizona to Southern California. Also in Sonora and Lower California. Later Swezey collected this bug at Kahuku (See P.H.E.S. VI, 237) and at Kailua, as well as at Ewa Plantation Company (See P.H.E.S. VI, 240). November 4, 1926, Mr. Swezey collected this little bug on tomato-vines on Maui, which is the first record of its occurrence on that Island.

I find that this bug, and a closely related species, *E. notatus* Dist., are very injurious to tobacco in Brazil (See Rev. Appl. Ent. Ser. A. XII, 66). That paper states that "the eggs are laid in the median nerve of the lower surface of the leaf; they hatch in 7 days, and the adults appear 9 days later. The life of the adults is about 9 days. The generations follow each other uninterruptedly. As a result of attack the leaves become yellow and dry prematurely; as the capsids fly from plant to plant they may also transmit various diseases of the tobacco plant."

I have not noticed any injury from the bugs on the leaves of

tomato plants, and we have no record of this mirid as a pest of tobacco in Hawaii. It certainly is a pest to be on the lookout for, if one is attempting to grow the latter crop.

Such a pest should not be hard to control with our miscible oil or emulsion sprays. In a rainy section several applications will probably be necessary.

Preliminary Notes on Pests of Agricultural Crops of Kona, March 15, 1928.

BY J. F. ILLINGWORTH

(Presented at the meeting of April 5, 1928.)

Coffee

1. Green scale (*Coccus viridis* Green) produces the so-called coffee-blight, a black smut forming on leaves and cherries. This is a fungus growing on the honeydew excreted by the scale insects. The history of this pest in Hawaii is interesting, starting about 1905 (see Hawaiian Forester II, 397). The scale was first noticed on lemon trees, and probably came from Fiji. It destroyed the coffee industry of Ceylon in the course of 10-20 years. *Natural enemies* are very prolific, holding this pest well in check under favorable climatic conditions. With the constant showers, at this season, the fungus introduced from Florida is very effective, killing the scale and growing out a short fringe from the borders. The chalcid enemies (*Prococcophagus orientalis* Howard, and Encyrtus sp.) appear to be abundant. The predaceous lady bird beetles (*Orcus chalybeus* Boisd. from Australia and *Chilocorus circumdatus* Shön. from China in 1895) are doing good work.
2. Mealy bugs (*Pseudococcus brevipes* Cockerell) are also present in the axils of the leaves and on twigs. These are well under control. I noticed lady bird beetles (*Lindorus* [*Rhizobius*] *ventralis* Erich. and *Cryptolaemus montrouzieri* Mulsant) everywhere present. These were both introduced from Australia via California in 1894.
3. Mites of very tiny size are abundant on the under sides of the leaves. The white spots composed of their empty cast skins are very noticeable even to the naked eye.

4. Mediterranean fruit fly (*Ceratitis capitata* Wied.) appears to be held well in check by natural enemies. *Diachasma tryoni* Cameron, introduced from Australia in 1913, was bred out in considerable numbers, from the maggots.
5. Plant lice (*Toxoptera aurantiae* Koch.) appear to be held well in check by natural enemies. I noted Syrphids (*Allograpta obliqua* Say), the maggots feeding upon the adult plant lice; the green lacewing fly (*Chrysopa microphya* McL.) was also present, and lady bird beetles (*Platyomus lividigaster* Muls. and *Coccinella inequalis* Fab.) both introduced from Australia, 1894.

Minor Pests of Coffee.

Grasshoppers (*Elimaea punctifera* Walk. and *Conocephalus saltator* Sauss.), springtails on leaves at the higher levels, above the road. Scavenger caterpillars (*Ereunetis simulans* Butl.) infest the places where the old branches have been badly pruned; they cover the dead wood of the wounds with their webs, which accumulate litter. They appear to be preyed upon by small ichneumons. Tree rats do considerable damage, breaking over the ends of branches, the dead leaves of which make the orchards unsightly.

Cotton

1. Pink bollworm (*Pectinophora gossypiella* Saund.) is by far the most serious pest. It is preyed upon by a number of different wasps. Willard (U.S.D.A. Tech. Bull. No. 19, Nov., 1927) records seven. I secured the braconid, *Chelonus blackburni* Cam., the ichneumon, *Ephialtes* (*Pimpla*) *hawaiiensis* Cam., and the chalcid, *Chalcis obscurata* Walk.
2. Black scale (*Saissetia nigra* Nietn.) is fairly well controlled by fungus and other natural enemies.
3. Mealy bugs (*Pseudococcus filamentosus* Cockerell, and *Pseudoccus brevipes* Cockerell) are now little in evidence, being well controlled by natural enemies. I observed everywhere numerous lady bird beetles, belonging to two species, *Lindorus* (*Rhizobius*) *ventralis* Erich, and *Cryptolaemus montrouzieri* Muls. both introduced from Australia via California in 1894.
4. Plant lice (*Aphis gossypii* Glover) are parasitized by *Lysiphlebius* sp. introduced from California (See Proc. Haw. Ent. Soc. V. 345).

5. Budmoth (*Batrachedra rileyi* Walsm.) bred out abundantly from the diseased bolls. These are preyed upon by various wasps to feed their young. I observed *Polistes aurifer* Sauss., *Polistes hebraeus* Fab., and *Pachodynerus simplicicornis* Sauss. collecting such caterpillars. The latter wasp, I find, is a rather recent (1911) emigrant from America.

Minor Pests of Cotton.

Scarabaeid beetle (*Adoretus sinicus* Burm.). These beetles eat more or less of the foliage, but the most damage to the cotton plant is done by the grubs, feeding on the roots. Large grasshoppers (*Elimaea punctifera* Walk.) also feed on the foliage to some extent. These are preyed upon by minah birds. Mites, with the appearance of red spiders (*Tetranychus* sp.) do not do much damage; they were only found in a couple of places. Thrips (*Euthrips hawaiiensis* Morgan) are not abundant, though generally distributed. (See Proc. U. S. Nat. Mus. 46, 3. Also Proc. Haw. Ent. Soc. III, 60). There is also a small anthribid beetle (*Araecerus fasciculatus* DeG.) found in and about the bolls. These gnaw slightly among the bracts of the seed pod.

Tomato

1. Fruit worm (*Heliothis obsoleta* Fab.) is not very troublesome. I collected some of the caterpillars and the moths came to the trap-lanterns at night. The tachinid fly (*Archytas cirphis* Curran) introduced from Mexico by Osborn, is now abundant at Kona.
2. Mirid bug (*Engytatus geniculatus* Reut.) is a most serious pest of tomatoes, sucking the blossoms so that the fruit will not set. The flowers fall soon after opening.
3. Melon fly (*Chaetodacus cucurbitae* Coq.) does little damage. It is well parasitized by *Opius fletcheri* Silv. imported from India.
4. Slugs damage fruit that rests on the ground and the injured portion soon rots.

Cucumber

1. Melon fly (*Chaetodacus cucurbitae* Coq.) is still the worst pest. The growers trap many of the eggs by exposing split cucumbers on which the flies oviposit. These sections are then destroyed before the maggots escape.

2. Plant lice (*Aphis gossypii* Glover) is a general feeder, doing considerable damage to cucumber leaves and vines. Several natural enemies hold them in check. I observed the valuable work of a syrphid (*Allograpta obliqua* Say) and two kinds of lady bird beetles (*Platyomus lividigaster* Muls. and *Coccinella inequalis* Fab.).

Cabbage

1. Cutworms were reported troublesome on the young plants. These are probably controlled by the tachinid (*Archytas cirphis* Curran) now well established.
2. Diamond-backed cabbage moth (*Plutella maculipennis* Curt.) is a serious pest. It is well parasitized by an ichneumon (*Limnerium polynesiale* Cam.).
3. Cabbage louse (*Brevicoryne brassicae* L.) is very abundant in old patches. Many of the dried skins have circular holes in them where parasites have emerged. I bred out a number of tiny braconids.
4. Serpentine leafminer (*Agromyza pusilla* Meig.) is abundant and does considerable damage to the leaves.
5. Cabbage butterfly (*Pontia rapae* Linn.) is very abundant and destructive. A chalcid (*Chalcis obscurata* Walk.) emerged from a pupa of this butterfly collected.
6. Thrips, though abundant, do not appear to do any serious damage to the plant.

Beet and Spinach.

1. Beet web-worm (*Hymenia recurvalis* Fab.) caterpillars skeletonize the leaves. The moths were plentiful in weed patches near the gardens.
2. Plant lice (*Aphis gossypii* Glover) were sufficiently abundant to cause the leaves to dry down, producing a sickly appearance. The natural enemies are the same here as I have listed with cucumbers.

Citrus.

1. Green scale (*Coccus viridis* Green) is troublesome on orange trees located alongside coffee trees infested with this pest. The natural enemies I have listed under coffee.
2. Mediterranean fruit fly (*Ceratitis capitata* Wied.) does very little damage to citrus in Kona. This pest appears to be well

checked by natural enemies (See under coffee.). The best reference is U. S. Dept. Agr. Bull. 536, 1918.

3. Orange rust mite (*Phyllocoptes oleivorus* Ashm.) is also known as the silver mite of lemon. It occurs on both leaves and fruit.
4. Fuller's rose beetles (*Pantomorus godmani* Crotch) congregate among the leaves on the twigs; the larvae are found in the soil feeding on the root tips.

Papaya.

1. Green syrphid fly (*Volucella obesa* Fab.). Masses of eggs are laid on bark of older plants. The newly hatched maggots work their way into the stem, and cause a considerable flow of the milky sap.
2. Soldier fly (*Neoexaireta spinigera* Wied.) lays eggs in wounds caused by No. 1. Natural enemies, destroying the maggots of both the above species, are plentiful. I collected and bred out staphylinid (*Philonthus discoideus* Grav.) and hydrophilid beetles (*Dactylosternum abdominale* Fab.). Both the young and adults of these predaceous species were seen feeding upon the eggs and maggots of the flies.
3. The oriental blowfly (*Chrysomyia megacephala* Fab.) swarmed about the decomposing sap of the wounds, on which it feeds. I could find no indication of breeding in the putrid mass.

Macadamia Nut.

1. Leafroller (*Amorbia emigratella* Busck) is rather plentiful on young trees. The eggs are laid on the upper surface of the leaves. The clusters are coated over to protect them from the weather. Egg parasites are evidently doing effective work, from the exit holes I saw in some of the shells. The caterpillars also are preyed upon by several natural enemies. I saw a locust (*Xiphidiopsis liti* Hebard) pulling one out of its leaf-fold. Ants (*Pheidole megacephala* Fab.), too, are destructive to the larvae. Various wasps were also noted, searching among the foliage, particularly the predaceous *Pachodynerus simplicicornis* Sauss. An ichueumon (*Ephialtes hawaiiensis* Cam.) was seen in abundance. Swezey has recorded it as a parasite of this leafroller. (See Ent. Bull. 5, Exp. Sta. H.S.P.A. p. 43, 1907).

Mango.

There was no fruit on the trees at the season I was in Kona. The foliage appears to be remarkably free from pests.

Avocado.

The leaves and fruit are clean and bright. There was none of the mealy bug (*Pseudococcus nipae* Mask.) in evidence.

Banana.

There was little evidence of pests present. A few of the leaves showed the work of the rose beetle (*Adoretus sinicus* Burm.). The bunches were clean.

Pineapple.

1. The mealy bug (*Pseudococcus brevipes* Cock.) was the only pest in evidence on the wild variety. The plants appeared to be very thrifty with no signs of "Wilt."

Lantana.

1. Seedfly (*Agromyza lantanae* Frogg.) is the most effective check upon the spread of this pestiferous weed in the humid Kona district.
2. Plume moth (*Platyptilia pusillidactyla* Walk.) plentiful around the flower clusters.
3. Lantana leafbug (*Teleonemia lantanae* Dist.) is an effective check only in the dry region far below the main road.
4. Lantana butterfly (*Thecla bazochii* God.) was rather plentiful about the blossoms.
5. Gall fly (*Eutreta xanthochaeta* Ald.) is everywhere in evidence, and the galls are plentiful, yet it does little to check the growth.
6. Leaf miner (*Cremastobombycia lantanella* Busck) is not abundant enough to cause much distress to the foliage.
7. Lantana blight (*Orthezia insignis* Doug.) is effective only in the dry region near the coast. Though specimens were observed in the humid belt along the main road, it does not thrive there enough to do any good.

Guava.

1. Black scale (*Saissetia nigra* Nietn.) is found on scattered plants, but does little good in checking growth. It is preyed on

by fungus. No mealy bug (*Pseudococcus nipae* Mask.) was observed. The humid climate of the Kona district, along the main road is perfect for the growth of this plant, and it is practically free from natural enemies. Even the fruit showed little infestation from fruit fly (*Ceratitis capitata* Wied.).

Pests of Pineapple in Hawaii

J. F. ILLINGWORTH

(Presented at the meeting of May 3, 1928)

A. Affecting the root system:

1. Snails (*Caecilioides baldwini* Ancey) feed on the root tips —favor moist location, not widely distributed.

2. Symphylids (*Scutigerella immaculata* Newport.). Very similar in habits and distribution to the above. Very destructive to root tips wherever they occur.

3. Mycetophilidae (*Sciara molokaiensis* Grimshaw). Periodic in occurrence, following wet weather; larvae gnaw tender young root tips during periods of drought.

4. Collembola. Numerous species occur in pineapple soils,—a slender white form in great numbers. These gnaw pits in living roots during dry spells.

5. Mites. (*Rhizoglyphus phylloxerae* Riley). Very destructive in a few localities.

6. Mealy bugs (*Pseudococcus brevipes* Cockerell) congregate on young roots in fields poorly prepared.

7. Nematodes—several species, very destructive.

Minor pests: Pauropodidae, *Japyx* sp., sowbugs, pillbugs, burrowing cockroaches (*Pycnoscelus surinamensis* Linnaeus), scarabaeid grubs (*Adoretus sinicus* Burmeister), Fuller's rose beetle (*Pantomorus godmani* Crotch), several species of tiny centipedes, etc.

B. Affecting the fruit, stem and leaves:

1. Mealy bug (*Pseudococcus brevipes* Cockerell).

2. Scale (*Diaspis bromeliae* Kerner).

Both the mealy bug and scale congregate on plants that are fail-